

Parasites might spur evolution of strange amphibian breeding habits

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Parasites can decimate amphibian populations, but one University of Georgia researcher believes they might also play a role in spurring the evolution of new and sometimes bizarre breeding strategies.

Brian Todd, a researcher at the UGA Odum School of Ecology Savannah River Ecology Lab, explains that most amphibians start their lives in water (tadpoles are a good example), and then make their way onto land as adults and return to the water to breed. But there are other breeding strategies as well.

Take, for instance, the Darwin's frog, the species that swallows its eggs and, a few weeks later, regurgitates its young. Or the marsupial frog, a species that carries its eggs on its back until they hatch. Several species lay eggs in small puddles on land or high up in trees where they hatch as miniature versions of adults, bypassing the larval stage entirely.

Researchers have hypothesized that natural selection favored these non-traditional breeding strategies as a way to avoid predatory fish or the risk of a breeding pond or stream drying up. In a review article published in the November issue of *The American Naturalist*, Todd argues that the diversity of reproductive strategies that amphibians employ might also be influenced by the benefits that come from avoiding viruses, fungi and other parasites.

“Most parasites known to affect amphibians tend to be aquatic, so there are clearly benefits to using non-traditional breeding strategies,” Todd

said.

He points out that breeding in ponds or streams tends to concentrate amphibians in the same place at the same time, which increases the transmission of parasites. The process of metamorphosis decreases an amphibian's immunity, which is another factor that benefits parasites at the expense of their amphibian hosts.

Todd said that the idea that parasites can influence reproductive strategies can be tested. A disease caused by a chytrid fungus is causing rapid declines in amphibian populations in Central and South America, and researchers can examine the populations over time to see if species with non-traditional breeding habits are less affected. Scientists could also compare the burden of parasites on traditional and non-traditional breeders.

Of course, there are benefits to breeding in the water – most importantly that there is plenty of food. But Todd said that when the death rate from parasites – or any other aquatic threats – exceeds the benefits that come with rapid growth, natural selection begins to favor strategies that shorten or eliminate the aquatic life cycle phase altogether.

“The role of parasites has been overlooked until now,” Todd said. “I want to highlight the idea that they might be important to evolution so that people can begin studying amphibians in a new light.”

Source: University of Georgia

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